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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---------------------------------------------|-------------|----------------------|---------------------|------------------|
| 09/893,588 | 06/29/2001 | Takashi Kumamoto | 219.40240X00 | 5620 |
| 21186 | 7590 | 01:15/2004 | EXAMINER | |
| SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A. | | | CHAMBLISS, ALONZO | |
| P.O. BOX 2938 | | | ART UNIT | |
| MINNEAPOLIS, MN 55402 | | | PAPER NUMBER | |

2827

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/893,588

Applicant(s)

KUMAMOTO, TAKASHI

Examiner

Alonzo Chambliss

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-10, 13-22 and 25-34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-10, 13-22 and 25-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/29/01 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/22/03 has been entered.

Response to Arguments

2. Applicant's arguments filed 11/3/03 have been fully considered but they are not persuasive for the same reason mention in the response to arguments of the final rejection filed on 8/1/03.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3-10, 13-22, and 25-34, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh (U.S. 6,060,373) in view of Grigg et al. (U.S. 200210068453).

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With respect to Claims 3, 13, and 25, Saitoh discloses a back, grind/mounting arrangement comprising bumped die 11 with a planarizing support layer 13 provided on a bumped surface of the bumped die 11. The support layer 13 comprises a pre-back-grind underfill layer 18 both to provide substantially planar back-grind wafer support during any back grind process (see col. 1 lines 5-19, col. 2 lines 50-67, and col. 3 lines 1-30; Figs. 1 a-1 j, 2a-2d, and 2n-2p). Saitoh does not explicitly disclose using the preback grind underfill layer to provide underfill material during any mounting/under-fill process and an adhesive protection tape including a flexible conforming layer applied to the under-fill layer, wherein the conforming layer covers the remainder portion of the bump-bodies not covered by the under-fill layer of bumps on the bumped surface to further improve a planarity of the support layer. However, Grigg discloses a pre-back grind underfill layer 30 to provide underfill material during any mounting/under-fill process. The pre-back grind underfill layer is utilized in the back-grinding process of the wafer (see page 7, paragraph 63-65; Figs. 5 and 6). Grigg further discloses a support layer comprising an adhesive protection tape including a flexible conforming layer applied to the under-fill layer 30. The conforming layer covers the remainder portion of the bump-bodies not covered by the under-fill layer 30 of bumps¹⁸ on the bumped surface to further improve a planarity of the support layer (see page 8, paragraph 65). Thus, Saitoh and Grigg have substantially the same environment of a mold compound for aiding in the back grinding of a die. Therefore, it would have been obvious to incorporate the underfill layer with the device of Saitoh, since the pre-back grind underfill layer would aid in the back grinding process of the wafer and to absorb the

inherent physical and thermal stress resulting from differing expansion rates of an integrated circuit semiconductor die and its interconnecting substrate as taught by Grigg.

With respect to Claims 4, 15, and 27, Saitoh discloses the under-fill layer 18 covering an entirety of bump-bodies of bumps 17 on the bumped surface (see Fig. 1f).

With respect to Claim 5, 16, and 28, Saitoh discloses the support layer 13 comprises an adhesive protection tape applied to the under-fill layer 18 (see col. 3 lines 1-11; Figs. 1h and 2n).

With respect to Claims 6, 17, and 29, Saitoh discloses the under-fill layer 18 being a thickness beyond a height thickness of the bump-bodies 17 when incorporate with the under-fill layer 30 taught by Grigg, would provide additional under-fill material to under-fill structures other than the bumps 18 during any mounting/under-fill process.

With respect to Claims 7-9, 18-20, 30-32, Grigg discloses the under-fill layer 30 comprise a thermoplastic polymer material (see page 6, paragraph 57).

With respect to Claims 10, 21, and 33, Grigg discloses the under-fill layer 30 comprising an opaque material to provide at least one of UV light and radiation protection to a surface of the bumped-die, since a UV sensitive tape is used in the process of thinning the wafer allowing for a loss in the adhesive properties of the tape to occur during the curing by UV radiation (see page 8, paragraph 65).

With respect to Claims 14 and 26, Grigg discloses providing a secondary underfill layer to under-fill 30 to structures other than the bumps as encountered during any mounting process (see page 9, paragraph 76).

With respect to Claims 22 and 34, Grigg discloses the arrangement, which is a flip-chip back-grind/mounting arrangement (see page 8, paragraphs 70-72; Fig. 6).

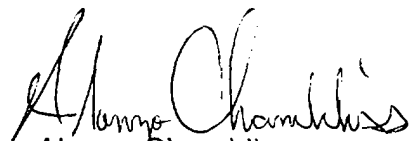
The prior art made of record and not relied upon is cited primarily to show the product and device of the instant invention.

Conclusion

5. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

AC/January 11, 2004


Alonzo Chambliss
Patent Examiner
Art Unit 2827